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Central Intelligence Agency

Washington, D.C. 20505

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29 DEC 1983

MEMORANDUM FOR: Robert Pelletreau
Deputy Assistant Secretary for
Near Eastern and South Asian Affairs
Department of State

SUBJECT: Transmittal of Report on Syrian Use
of Yarmuk River Water

1. Attached is the study of Syrian use of the Yarmuk River that you requested from on 30 November. As you will note, we found that Syria is already using much more of the basin's water than any of us had expected and is continuing to develop additional sources by drilling new wells and building additional surface reservoirs. These developments seem to raise questions about Jordanian and Israeli plans for downstream use of the remaining flow.

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2. If you have any questions on these materials please contact , Chief, Near East Branch, Geography Division,

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Office of Global Issues

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Attachment:
The Yarmuk River: Increasing Syrian Water Diversion
Cause for Israeli and Jordanian Concern
GI M 83 10283 December 1983

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SUBJECT: The Yarmuk River: Increasing Syrian Water Diversion Cause for Israeli and Jordanian Concern

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The Yarmuk River: Increasing Syrian Water Diversion Cause for Israeli and Jordanian Concern

SUMMARY

Syria is increasing its use of water originating in its portion of the Yarmuk River watershed. Since 1971 twelve surface storage dams and six smaller catchments have been constructed on tributaries of the Yarmuk; six of the dams have been built since 1979. Two additional dams are under construction. We estimate that Syria's annual use of Yarmuk sources may now be in excess of 200 million cubic meters--nearly 50 percent of the Yarmuk's historic average annual volume.

Syria's increased use of Yarmuk water has resulted in a corresponding reduction of the water available for the two downstream users, Jordan and Israel. Jordan's development plans for the East Bank will be severely disrupted if it is unable to rely on a Yarmuk flow significantly larger than it presently uses. While Israel uses on average only a small amount of this water for the Yarmuk (Adasiyah) Triangle, a reduced Yarmuk flow will inevitably complicate the dispute between Jordan and Israel.

This memorandum was prepared by [redacted] *Geography Division, Office of Global Issues. Comments and queries are welcome and may be directed to the Chief, Near East Branch, Geography Divsion,* [redacted]

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Background

The longstanding dispute between Israel and Jordan over sharing water from the Yarmuk River has focused since early 1982 on the diversion of water from the lower end of the river into Israel's Yarmuk Triangle and into Jordan's East Ghor Canal. During recent months Jordan has expressed concern about the unusually low flow in the Yarmuk, following a winter and spring when precipitation in the drainage basin was much above average. As a consequence, both Israel and Jordan have speculated that Syria may be increasing its diversion of the river's sources at the expense of the other two riparian states. This study attempts to identify the amount of river flow that is being used by Syria and to determine if this amount has changed notably during recent years.

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The Yarmuk Watershed

The Yarmuk watershed occupies an area of about 6,800 square kilometers (km^2) of which 1,800 km^2 (25 percent) is in Jordan and 5,000 km^2 (75 percent) is in Syria (map 1). The Syrian portion is about the size of Delaware. The basin drains roughly the area stretching from the Golan Heights to the Jabal ad Duruz, east of As Suwayda in Syria, and from Irbid to Al Mafraq in Jordan. Most of the area in both Jordan and Syria is used for rain-fed agriculture, mainly grain crops.

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The Yarmuk River is only about 55 kilometers long, but it is fed by an extensive network of longer tributaries, most of which are intermittent streams (wadis) which carry water only in winter and spring; a few streams are perennial and are at least partially fed by springs. The river's average annual flow, based on measurements from 1927 to 1975, was 450 million cubic meters (mcm) as measured at Al Adasiyah near where it enters Jordan's East Ghor diversion canal.[1] Of this flow, about 200 mcm was steady base flow at the rate of about 6 cubic meters per second. The remaining 250 mcm comes from winter and spring flood flows, which ranged from 40 to 600 mcm annually during the period of record. (By comparison, the average annual flow for Washington DC's Rock Creek is 55.5 mcm). The Yarmuk's most important tributary is the Nahr ar Ruqqad/Wadi ar Ruqqad which drains the area of highest rainfall, (Golan Heights from Mount Hermon to Fiq). Its average annual flow measured at Ar Rafid was 73.3 mcm.

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Precipitation, mostly rainfall, is the source of the watershed's water supply, and varies from over 900 millimeters (35 inches) on the southeastern slopes of Mount Hermon to between 200 and 300 millimeters (8 and 12 inches) on the lava plateau

[1]The average annual flow was less--about 400 mcm--from 1954 to 1975.

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west of the As Suwayda (map 2). The average for the entire Yarmuk drainage basin is almost 400 millimeters (16 inches) annually. Although no precise figures are available, the higher average rainfall on the Syrian portion of the basin suggests that as much as 80 percent of the Yarmuk's flow, or more than 350 mcm, originates in Syria.

Yarmuk Water Use

During the decade of the 1970s Syrian use of water in the Yarmuk watershed increased to a 1980 level of about 180 mcm annually--about 40 percent of the Yarmuk's annual flow--

Syria, moreover, has the potential to control at least 350 mcm of the Yarmuk's total discharge, about four times as much as the 90 mcm allocated annually under the Johnston Plan[1]--which is often cited as the official sharing arrangement by Israel, Jordan, and Syria, when useful to their arguments.

the Syrian Ministry of Irrigation

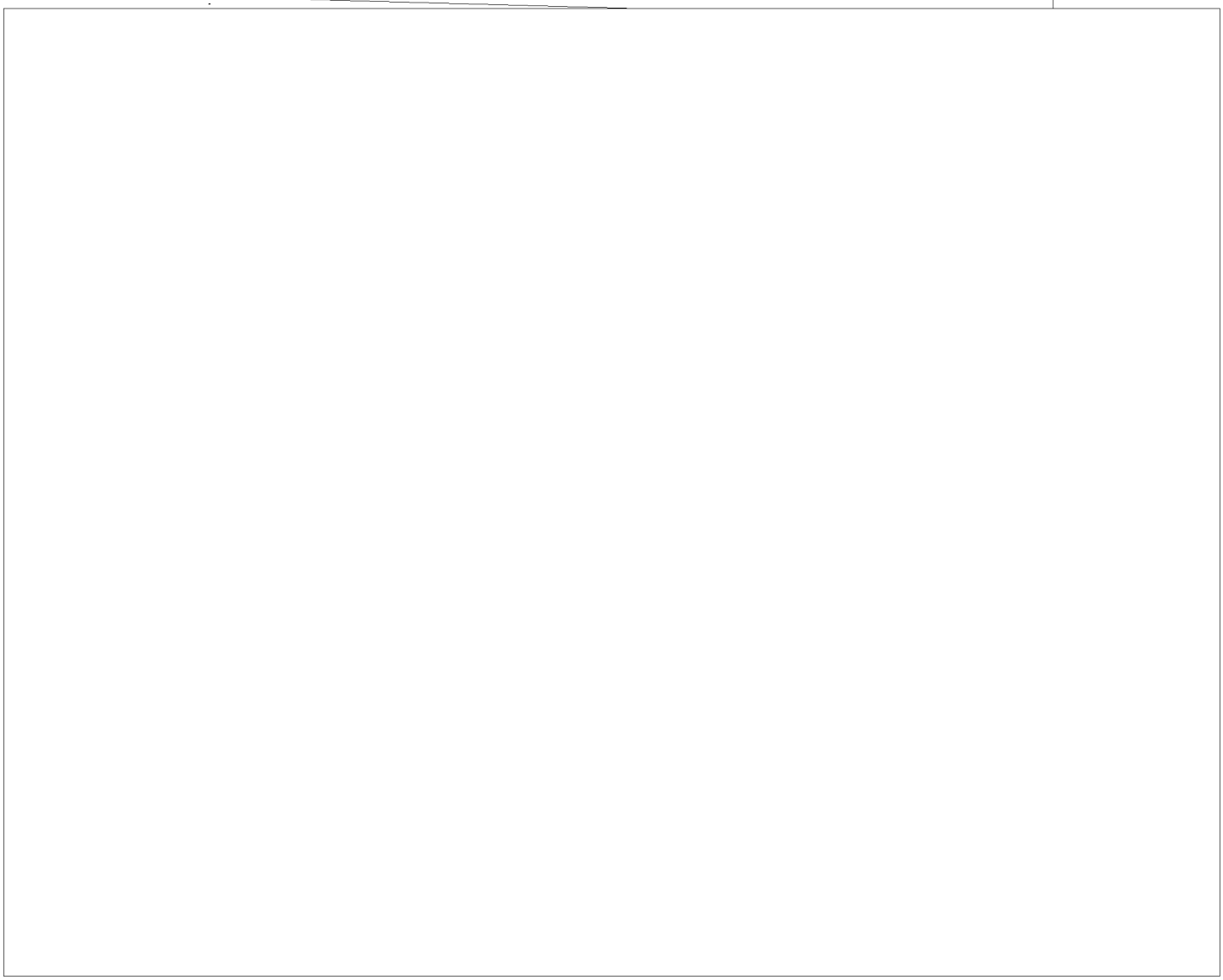
stated Syria's belief that all the waters of the Yarmuk originating on Syrian territory are Syrian. (C)

Although we do not know if Syria actually intends to make full use of its Yarmuk sources and can neither confirm nor refute the claim that it was using 180 mcm of Yarmuk sources in 1980, substantial evidence is available to show that Syria's water use has increased significantly since the 1970's. Since the mid-1970s the Syrian Government has sought to improve the country's agricultural productivity by increasing the amount of land under irrigation in Syria's dry farming areas. While the 1981-1985 Five Year Plan emphasizes dryland irrigation in the eastern part of the country, improved productivity in the moister areas, including the Yarmuk watershed, is recognized as of increasing importance. Specific plans include the continuing construction of Yarmuk basin dams and associated irrigation networks and the increased drilling of deep wells northwest of Dar'a. Although hundreds of wells are reported to be in use within the Yarmuk basin for irrigation, no data are available on their total output or on the affect of well pumping on the Yarmuk's flow.

The affect of dam construction on the Yarmuk's tributaries can be more readily documented and tends to support the Syrian contention that they are using a significant share of the river's

[1]The Johnston Plan was a United States initiative, in 1953-55, aimed at seeking an agreement with Israel and the neighboring Arab states on a plan for the "diversion and use" of the waters of the Jordan River basin, and possibly, the internationalization of Jerusalem. It was named for President Eisenhower's special representative on this matter--Eric Johnston. Although most elements of this plan were eventually agreed to by all riparian parties (Israel, Jordan, Lebanon and Syria), formal agreements were never concluded.

flow. Prior to 1980 Syria had built six storage dams, all of which were constructed after 1971, and six smaller water catchments in the watershed (table and photos). Since 1980 six additional surface storage dams have been constructed on all of the major Syrian tributaries to the Yarmuk, adding significantly to Syria's capacity to control the watershed's discharge. Two additional dams are under construction on the Wadi ar Ruqqad just to the east of the United Nations Disengagement Observer Force (UNDOF) area. We estimate that the reservoirs behind these dams have a combined capacity of more than 60 mcm. Their actual impact on the Yarmuk's flow is probably greater than this amount because they are used to provide irrigation water for Syrian agriculture during the winter and spring at the time of maximum stream flow.



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most of these storage dams are fed by surface runoff; a few are partially springfed. During the summer of 1979 most of the larger reservoirs were dry, and consequently had no effect on downstream flows at that time. In July of 1983 the reservoirs were full. This suggests that the effect of the dams on the lower Yarmuk flow is most noticeable during wet years such as 1983.

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To date Jordan has made little use of its part of the Yarmuk watershed other than the diversion of water into the East Ghor Canal; only one storage dam has been constructed on a tributary near the Syrian border. Jordanian plans to increase the diversion into the East Ghor Canal have so far been thwarted by failure to obtain Israeli agreement to proceed with work in the Yarmuk river bed to improve water flow into the canal. We estimate that total Jordanian withdrawals from the Yarmuk are less than 150 mcm annually, considerably below current and planned requirements.

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The Israelis, who in their occupation of the Golan Heights control a small part of Syria's Yarmuk watershed, have built two large storage dams since 1971 on tributaries to the Yarmuk River. One is at the Israeli settlement of Merom Golan and the other is in the southern Golan near the Israeli settlement of Avne Etan. The two reservoirs' combined capacities probably exceed the 3.5 mcm that a 1970 Israeli plan suggested Israel would withdraw from Yarmuk tributaries on the Golan Heights. In addition, Israel receives 25 mcm annually from the lower Yarmuk for irrigation in the Yarmuk Triangle area and pumps a large but unknown quantity of water from the lower Yarmuk during the high water season for storage in Lake Tiberias.

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Implications of Increased Syrian Water Use

Jordan is already experiencing a precarious balance between limited water supplies and growing water demands for irrigated agriculture and urban consumption. current consumption for all purposes amounts to between 500 and 600 mcm annually. Plans to relieve urban water shortages and to improve and expand irrigation in the Jordan Valley depend almost entirely on the use of at least 200 mcm of additional water from the Yarmuk by building the Maqarin storage dam and improving inlet facilities to the East Ghor Canal. These plans are at present being stymied by failure to achieve Israeli and, secondarily, Syrian agreement to work on these structures. Although these political problems have been the most serious Yarmuk water issue up to now, the preemptive Syrian water use is probably equally harmful to Jordan because it is practically irreversible. Any Syrian use of Yarmuk sources

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that exceeds roughly 100 mcm annually will require a corresponding scaling down of Jordanian plans. 25X1

The implications of the Syrian actions for relations between Israel, Jordan, and Syria are more speculative. The 25 mcm of the Yarmuk's flow that is presently provided annually to Israel's Yarmuk Triangle is not large and would presumbly be continued by Jordan under any eventuality. Probably more important would be Israel's reaction to a further reduction of the residual Yarmuk flow that is not used by Syria or Jordan. One result of increased Syrian water use, consequently, may be that Israel will harden its opposition to Jordan's plans to improve the East Ghor inlet and construct the Maqarin dam. 25X1 25X1

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STORAGE DAMS IN YARMUK BASIN, JULY 1983

Dam[1]	Year Built	Coordinates	Nearest Town (Dam name)	Stream/Wadi	Comment
1	1972-74	33°08'N 35°46'E	Merom Golan[2]	Tributary to Wadi ar Ruqqad	Larger dam; built by Israelis; full.
2	1983-u/c	33°06'N 35°52'N	Al Qunaytirah (Ar Ruwayhinah)	Wadi ar Ruqqad	Larger dam (2 mcm) being built on site of a previous small water catchment; 1 km from UNDOF.
3	1980-81	33°01'N 35°56'E	Al Hajjah (Al Hajjah)	Tributary to Nahr al Allan	Larger dam (3 mcm); full.
4	1983-u/c	32°56'N 35°55'N	Ar Rafid	Wadi ar Ruqqad	Large dam being built 2 kms from UNDOF
5	Pre-1967	32°55'N 35°51'E	Yonatan	Tributary to Wadi ar Ruqqad	Syrian-built reservoir; appears heavily silted and in disuse
6	1980-81	32°53'N 35°58'E	Tasil (Ghadir al Bustan)	Nahr al Allan	Larger dam (6 mcm); full.
7	1980-81	32°52'N 36°07'E	Ash Shaykh Miskin (Tasil al-Shaykh Miskin)	Nahr Al Harir	Largest of newlybuilt storage dams; full.

[1]Dam numbers correspond to numbers on map

[2]Dam numbers 1, 5, and 8 are in the Israeli-occupied Golan Heights; dam no. 32 is in Jordan

(Cont'd)

Dam	Year Built	Coordinates	Nearest Town (Dam Name)	Stream/Wadi	Comment
8	1974-75	32°48'N 35°46'E	Avne Etan	Wadi al Hamra	Larger dam built by Israelis; full.
9	Mid-1970s	32°49'N 36°06'E	Ash Shaykh Miskin (Ibta, large)	Nahr al Harir	Larger dam (3 mcm); full.
10	Mid-1970s	32°49'N 36°05'E	Ash Shaykh Miskin (Ibta, small)	Tributary to Nahr al Harir	Larger dam (1 mcm); full.
11	Mid-1970s	32°47'N 36°01'E	Tasil	Tributary to Nahr al Harir	Small catchment; full.
12	1980-83	32°45'N 36°02'E	Tafas (Gharbi Tafas)	Nahr al Harir	Larger dam; full.
13	Mid-1970s	32°43'N 36°25'E	As Suwayda	Tributary to Wadi adh Dhahab	Smal catchment; full.
14	Mid-1970s	32°42'N 36°22'E	As Suwayda	Tributary to Wadi adh Dhahab	Small catchment; empty.
15	Mid-1970s	32°43'N 36°49'E	As Suwayda (Rum Hawilayn)	Tributary to Wadi abu adh Dhahab	Larger dam (4.6 mcm); mostly spring fed; full.
16	Mid-1970s	32°41'N 36°29'E	As Suwayda (Al Aslihah)	Tributary to Wadi adh Dhahab	Small catchment; full.
17	Pre-1968	32°39'N 36°34'E	Rasas	Wadi adh Dhahab	Small catchment; full.
18	1979	32°37'N 36°35'E	Rasas (Rasas)	Tributary to Wadi adh Dhahab	Larger dam; partly spring fed; three-quarters full.

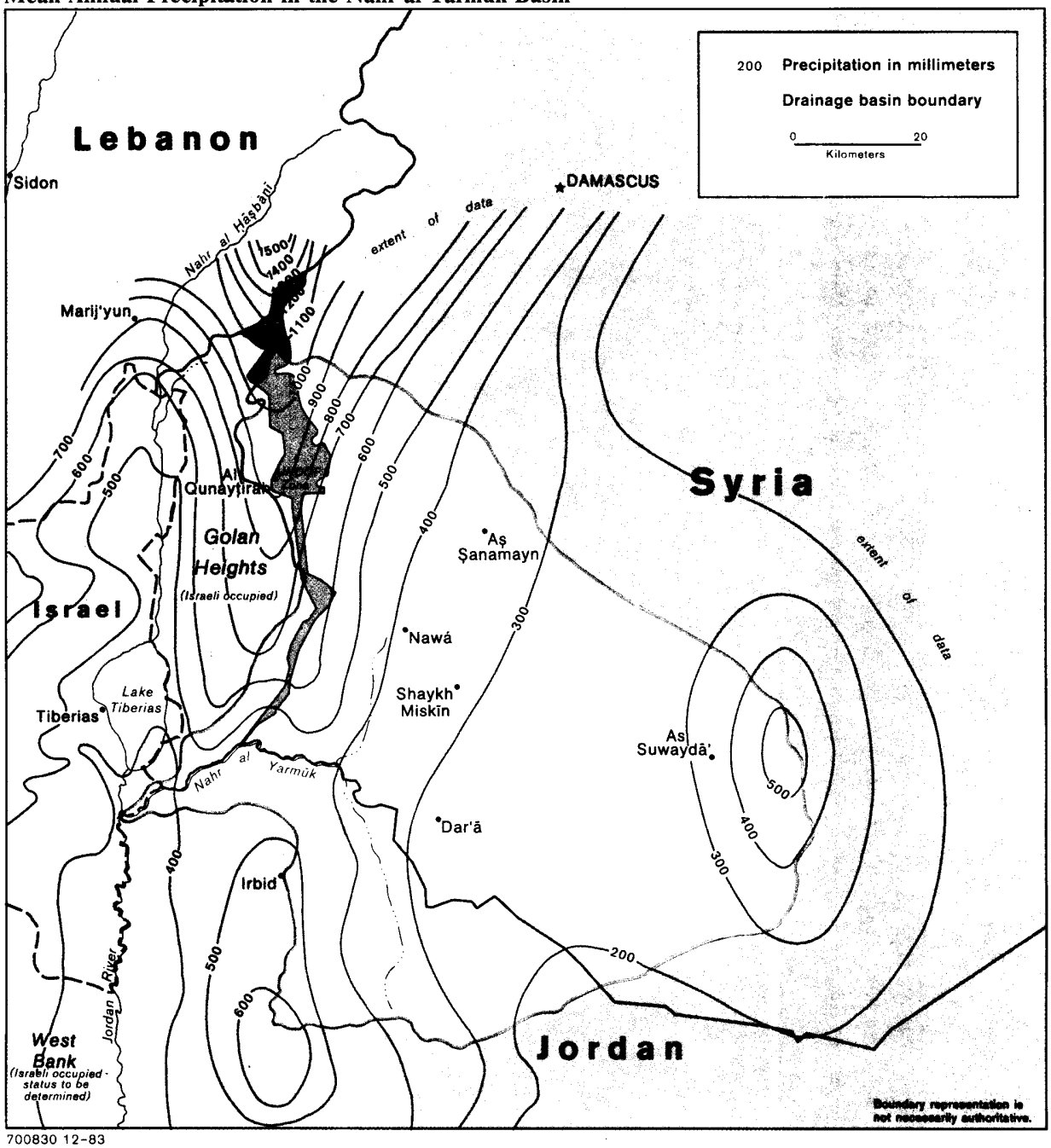
(Cont'd)

Dam	Year Built	Coordinates	Nearest Town (Dam Name)	Stream/Wadi	Comment
19	Mid-1970s	32°41'N 36°20'E	Al Musayfirah	Wadi adh Dhahab	Small catchment; one-quarter full.
20	1980-81	32°41'N 36°17'E	Al Musayfirah (Ghariyat ash Sharqiyah)	Wadi adh Dhahab	Larger dam; one-quarter full.
21	Mid-1979s	32°40'N 36°05'E	Dar'a (Uthman)	Wadi adh Dhahab	Small catchment; less than one-quarter full.
22	-	32°42'N 36°01'E	Muzayrib (Lake Muzayrib)	Tributary to Wadi adh Dhahab	Spring-fed natural lake with local irrigation system; level normal.
23	Mid-1970s	32°35'N 36°06'E	Dar'a (Dar'a)	Wadi az Zaydi	Oldest large dam (15 mcm) in watershed; full.
24	Pre-1968	32°33'N 36°11'E	At Tayyibah	Tributary to Wadi az Zaydi	Small catchment; empty.
25	Pre-1968	32°33'N 36°14'E	At Tayyibah	Wadi az Zaydi	Small catchment; empty.
26	Pre-1968	32°34'N 36°16'E	Jizah	Wadi az Zaydi	Small catchment; empty.
27	Pre-1968	32°32'N 36°29'E	Busra Ash Sham	Tributary to Wadi az Zaydi	Small catchment; one-half full.
28	Pre-1968	32°32'N 36°29'N	Busra Ash Sham	Tributary to Wadi az Zaydi	Small catchment; one-half full.
29	Pre-1968	32°32'N 36°31'E	Busra Ash Sham	Tributary to Wadi az Zaydi	Small catchment; empty.
30	Pre-1968	32°33'N 36°40'E	Al Qurayyah	Tributary to Wadi az Zaydi	Larger dam enlarged from small catchment in 1979; nearly full.

(Cont'd)

Dam	Year Built	Coordinates	Nearest Town (Dam Name)	Stream/Wadi	Comment
31	Pre-1968	32°30'N 36°36'E	Al Qurayyah	Tributary to Wadi az Zaydi	Small catchment; one-third full.
32	Mid-1970s	32°28'N 36°15'E	Al Mafraq (Jordan)	Tributary to Wadi az Zaydi	Larger dam; only dam in Jordanian Yarmuk watershed; one-quarter full.

Mean Annual Precipitation in the Nahr al Yarmūk Basin



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